CLAIMS

1. A drive system suitable for high bandwidth current control of a three-phase voltage source inverter in its overmodulation region, said system comprising:

a feedback path including a harmonic decoupling block that subtracts selected harmonic components from signals representative of a corresponding motor phase current signal to generate corrected feedback signals;

subtractor blocks that subtract the corrected feedback signals from signals representative of open-loop magnetizing reference currents to generate difference signals; and

a modulation block that utilize said difference signals to produce signals to drive a three-phase voltage source inverter in an overmodulated six-step mode.

2. A drive system in accordance with Claim 1 wherein said signals representative of a corresponding motor phase current signal are signals in a rotor field reference frame, and said feedback path further comprises:

a coordinate transform block that transforms feedback signals in a stationary reference frame to said signals representative, in said rotor field reference frame, of a corresponding motor phase current signal; and

a harmonic decoupling block that subtracts components of at least one 6n order harmonic contained in said signals representative, in

said rotor field reference frame, of a corresponding said motor phase current signal, to generate corrected feedback signals;

wherein n is an integer, $n \geq 0$, and said harmonics are relative to a fundamental frequency of a phase current of the three-phase voltage source inverter.

3. A drive system in accordance with Claim 2, wherein said harmonic decoupling block subtracts components of at least a sixth order harmonic.

4. A drive system in accordance with Claim 3 wherein said harmonic decoupling block comprises a d-channel block and a q-channel block, and said d-channel block and said q-channel block each comprise:

a first multiplier block that multiplies a first signal input to the harmonic decoupling block by a first sinusoid at a sixth harmonic frequency to generate a base band signal indicative of a sixth harmonic component contained in the first input signal,

a first low-pass filter block that inputs said base band signal and outputs a signal indicative of an average of the sixth harmonic component contained in the first input signal, and

a second multiplier block that multiplies said signal indicative of said sixth harmonic component contained in the first input signal by a sinusoid at said sixth harmonic frequency to produce a sixth harmonic cancellation component signal;

and said harmonic decoupling block further comprises a subtractor block that subtracts at least the sixth harmonic cancellation signal from one of said signals representative, in said rotor field reference frame, of a corresponding said motor phase current signal to produce one of said corrected feedback signals.

5. A drive system in accordance with Claim 4 wherein, in each of said d-channel block and said q-channel block, said first input signal is one of said signals representative, in said rotor field reference frame, of a corresponding said motor phase current signal.

6. A drive system in accordance with Claim 4 wherein said d-channel block and said q-channel block each further comprise a high pass filter block that filters one of said corrected feedback signals to produce a harmonic containing signal, and wherein said first input signal is said harmonic containing signal.

7. A drive system in accordance with Claim 4 wherein said harmonic decoupling block further comprises a frequency multiplier block that produces said sinusoids at said sixth harmonic frequency utilizing a second signal input to said harmonic decoupling block, wherein said second input signal is representative of a voltage vector signal from a three-phase motor.

8. A drive system in accordance with Claim 7 wherein said sinusoid utilized by said first multiplier block and said sinusoid utilized by said second multiplier block are both phase-referenced to said second input signal.

9. A drive system in accordance with Claim 3, wherein said harmonic decoupling block also subtracts components of a twelfth order harmonic.

10. A method for high bandwidth current control of a three-phase voltage source inverter, said method comprising:

subtracting selected harmonic components from signals representative of a motor phase current signal in a feedback path to thereby generate corrected feedback signals;

subtracting corrected feedback signals from signals representative of open-loop magnetizing reference currents to generate difference signals; and

utilizing said different signals to produce signals to drive the three phase voltage source inverter in an overmodulated six-step mode.

11. A method in accordance with Claim 10 wherein said signals representative of a corresponding motor phase current signal are signals in a rotor field reference frame, and said method further comprises:

transforming feedback signals in a stationary reference frame to said signals representative, in said rotor field reference frame, of a corresponding motor phase current signal; and

subtracting components of at least one 6n order harmonic contained in said signals representative, in said rotor field reference frame, of a corresponding said motor phase current signal, to thereby generate corrected feedback signals;

wherein n is an integer, n≥0, and said harmonics are relative to a fundamental frequency of a phase current of the three-phase voltage source inverter.

12. A method in accordance with Claim 11, wherein said subtracting components of at least one 6n order harmonic comprises subtracting components of at least a sixth order harmonic.

13. A method in accordance with Claim 12 further comprising, for each of a d-channel and a q-channel:

multiplying a first signal input to a harmonic decoupling block by a first sinusoid at a sixth harmonic frequency to generate a base band signal indicative of a sixth harmonic component contained in the first input signal,

low-pass filtering said base band signal to output a signal indicative of an average of the sixth harmonic component contained in the first input signal, and

multiplying said signal indicative of said sixth harmonic component contained in the first input signal by a sinusoid at said sixth harmonic frequency to produce a sixth harmonic cancellation component signal;

and said method further comprises subtracting at least the sixth harmonic cancellation signal from one of said signals representative, in said rotor field reference frame, of a corresponding said motor phase current signal to produce one of said corrected feedback signals.

14. A method in accordance with Claim 13 wherein, in each of said d-channel and said q-channel, said first input signal is one of said signals representative, in said rotor field reference frame, of a corresponding said motor phase current signal.

15. A method in accordance with Claim 13 wherein said first input signal is said harmonic containing signal, and further wherein, for each of said d-channel and said q-channel, said method further comprises high pass filtering one of said corrected feedback signals to produce a harmonic containing signal.

16. A method in accordance with Claim 13 further comprising producing said sinusoids at said sixth harmonic frequency utilizing a second signal input to the harmonic decoupling block,

wherein said second input signal is representative of a voltage vector signal from a three-phase motor.

17. A method in accordance with Claim 16 wherein said sinusoid utilized by said first multiplier block and said sinusoid utilized by said second multiplier block are both phase-referenced to said second input signal.

18. A method in accordance with Claim 12 further comprising said harmonic decoupling block also subtracting components of a twelfth order harmonic.